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terior lobe punctate; central portions of the sides levigate; cross incisions 1 and 2 not reaching the median carina. Elytra narrow, covering about two-thirds of the abdomen, lanceolate; the two longitudinal veins strong, approaching at the apex, along the borders, the reticulate veins coarse. Wings shorter than the elytra.

*Color* (siccus). Dark ferrugineous. Lower angles of the face and sides of the lip black. Tips of the elytra black. Apex of the wings dusky, rest transparent. Two reddish spots inside the posterior femora; tibiae transparent red.

*Male*. Similar in coloring only darker. Elytra black, somewhat paler at the base; wings transparent, cloudy at the apex (I think they are roseate when living.)

*Dimensions*. *Female*. Length 1.5 in.; pronotum .32 in.; elytra .55 in.; femur .95 in.; tibia .80 in. *Male*. Length .87 in.; pronotum .25 in.; elytra .55 in.; femur .62 in.; tibia .56 in.

*Hab*. South Colorado and New Mexico, from Cañon City south, near the mountains; mostly in the narrow valleys behind the first range of parallel hills called "Hog-backs."

**B. FLAVO-FASCIATUM, nov. sp.**

Very much like *B. nigrum* in size and carving.

*Female*. Central foveola of vertex very shallow, divided into two parts by a median carina; frontal ridge convex, sparsely punctured. Pronotum differs from previous species only in having the transverse incisions less distinct.

*Color* (siccus). Yellow varied with brown. Head yellow; lower angles of the face black; a very distinct yellow line, starting from the upper corner of each eye, reaches the posterior margin of the pronotum, bowing inward near the middle; bordered on each side by an irregular dark brown line; a dark line borders each eye posteriorly. Median carina of the pronotum dark brown or piceous-black; the transverse incision black; rest of the pronotum brownish, palest on the sides. Elytra formed as in *B. nigrum*, brown, a pale yellow stripe near the upper and lower margins of each, the upper divided near the base; three oblong yellow spots in a line along the middle, and a few smaller spots near the apex; reach the third abdominal segment. Wings transparent, dusky at the tips. A brown stripe along each side of the abdomen, near the dorsum; a yellow spot in it on each segment near the upper border. Venter yellow.

*Male*. Unknown.

*Dimensions*. *Female*. Length 1.5 in.; pronotum .38 in.; elytra .50 in.; femur .85 in.; tibia .76 in.

*Hab*. Same as preceding, but a much rarer species.

### Remarks on Huxley's Classification of Birds.

BY T. HALE STREETS.

In arranging and classifying the collection of birds' skeletons, crania, and sterna in the possession of the Academy, I was induced to compare some points in their osteology with the statements made by Prof. Huxley in an article entitled "On the Classification of Birds," which appeared in the Proceedings of the Zoological Society of London, 1867, Part II.

In this article Prof. Huxley divides birds principally according to the modifications presented by the bones forming the roof of the mouth, namely, the palatines, the maxillo-palatine processes, the pterygoids, the basi-ptyergoid processes, and the vomer.

After these the sternum, clavicles, coracoids, and occasionally other points claim attention as affording a basis for the classification.

He makes three orders. The first contains a single bird, the extinct Archæ-

[July,

opteryx. The second comprises the Struthious, or Ostrich family. The third embraces all the remaining existing birds. To this last he gives the name Carinatae.

The Carinatae he subdivides into four sub-orders, namely, the Dromæognathæ, which have the Cassowaries as their type; the Schizognathæ, which are "characterized not only by the complete distinctness of the maxillo-palatines from one another and from the vomer, but by the slender and usually pointed form of the latter bone." The third suborder are the Desmognathæ. In these the maxillo-palatines unite with one another in the median line, thus filling up or bridging over the space which exists as a fissure in the Schizognathæ. The fourth suborder, the Ægithognathæ, "have a palatine structure, which is, in some respects, intermediate between that of the Schizognathous and that of the Desmognathous groups, while in others it is peculiar."

This introduction was deemed necessary in order to render intelligible the remarks which are to follow.

#### SCHIZOGNATHÆ.

This suborder is divided into six groups, named, respectively, the Charadriomorphæ, or Plover-form; the Geranomorphæ, or Crane-form; the Cecomorphæ, or Gull-form; the Spheniscomorphæ, or Penguin-form; the Alektoromorphæ, or Cock-form; and the Peristeromorphæ, or Dove-form.

In the group Cecomorphæ, Mr. Huxley states that the "*Procellaria gigantea* alone has presented basipterygoid processes." He had not been able to observe them in other Procellariidæ. I have come to the conclusion, from this statement, that his observations must have been limited to *Procellaria gigantea* and to the Diomedeinæ, else he could not have failed to observe them. The following are the species belonging to the Procellarinæ which were examined by me: *Procellaria gigantea*, *P. glacialis*, *P. glacialisoides*, *P. Lessonii*, *P. capensis*, *P. mollis*; *Puffinus tenuirostris*, *Puf. fuliginosus*, *Puf. Anglorum*; *Prion vittata*, and *Thalassidroma Leachii*. In all of these the basipterygoid processes were present, and well developed (except in *Thalassidroma*, where they were rudimentary), articulating with the pterygoid bones.

From the species examined it will be seen that the possession of these processes is characteristic of the subfamily. Their presence is the rule rather than the exception. Their absence is rather the exception. This fact is sufficient I think to justify a separation of them from the other Cecomorphæ, and to make a separate group of them under the name of Nectriomorphæ.

The Nectriomorphæ may be looked upon as an intermediate group, connecting the Cecomorphæ (which contains the Laridæ, the Columbidae, the Alcidæ, and the Diomedeinæ) and the Charadriomorphæ (which contains the Charadriadæ and Scolopacidæ).

The presence of the basipterygoid processes allies it with the latter.\* Its lamellar and concavo-convex maxillo-palatines is a feature common to both, but more characteristic of the Charadriomorphæ. The absence of the recurved process at the angle of the mandible connects it with the Cecomorphæ.

The vomer in Nectriomorphæ differs from that found in either of the two groups mentioned above. In these latter it is forked posteriorly, and embraces the basisphenoidal rostrum on each side. In most of the Cecomorphæ a boat-shaped fossa is left between the divergent posterior ends of the vomer. In Diomedeinæ the sides are more or less pressed together, obliterating the fossa. The vomer tapers to a point anteriorly. The upper portion of it is flattened

\* In *Glareola orientalis* the basipterygoid processes are absent. The maxillo-palatines are less lamellar than those found in the other Charadriomorphæ. The vomer is cleft posteriorly, but slender and rod-like anteriorly. The angle of the mandible presents the recurved process which is characteristic of the group.

This genus is evidently an aberrant form, but in which direction it inclines I am not prepared to say.

out horizontally, while the lower portion is vertical in direction, and scythe-shaped. This form of the bone may be more or less modified. It is not confined altogether to these groups.

In Nectriomorphæ the sides of the scaphoid fossa are flattened down, and the whole bone is compressed horizontally. It is somewhat tongue-shaped.

The group Geranomorphæ is not so well defined as the Charadriomorphæ and Cecomorphæ. It is represented by the Rallidæ, by the Psophinæ and Gruinæ of the family Ardeidæ, and by Ōtidinæ of the Struthionidæ.

The following are the characteristics of the group, as given by Huxley:

"The rostrum is relatively stronger than in the preceding group (Charadriomorphæ), and may even be short and arched.

"The basipterygoid processes are absent (ex. *Grus antigone*).

"The maxillo-palatines are concavo-convex and lamellar.

"The angle of the mandible is truncated.

"In the typical groups the sternum is comparatively narrow and elongated, and may be deeply notched or entire."

In that portion of the article where he considered the cranial characters alone, he states that the Rails are always devoid of basipterygoid processes.

I found them to exist only in *Ortygometra porzana*,\* where they are well developed.

In addition to the sternal characters mentioned, I may state the following: From the situation of the principal pneumatic foramen on the internal surface of the sternum there rises a ridge which is produced upward to the anterior border, where it becomes forked or branched, and may present either a Y- or T-shaped appearance. In the former case it looks very much like the bifurcated manubrium of the true Passerine birds. It was present in all the representatives of this group examined,† except *Fulica* and *Otis*.

In all of the Rails and in some of the others there is a small process produced upward from the symphysis between the clavicles. This is a character which is constant in the Herons. Its presence in the Rails shows an inclination towards the Ardeinæ.

In Alectoromorphæ,‡ or Cock-form, "the rostrum may be slender and depressed, or high and arched. Oval, flattened basipterygoid facets, sessile upon the basisphenoidal rostrum and articulating with corresponding surfaces upon the pterygoids, are always present. The maxillo-palatines are always lamellar, but vary greatly in size, being sometimes very small.

"The palatine bones are relatively long and narrow, with obsolete internal laminæ and rounded-off postero-external angles.

"The angle of the mandible is produced into a strong upcurved process."

In Peristeromorphæ, or Dove-form, "the rostrum is swollen at the tip.

"The skull is provided with narrow, but prominent, basipterygoid facets."

"The maxillo-palatines are elongated and spongy.

"The angle of the mandible is not produced and recurved.

"The sternum has two posterior notches, the inner pair of which may be converted into foramina."

Mr. Huxley states that "the Pteroclidæ in some respects, but not in cranial characters, approaches the Pigeons."

*Pterocles arenarius* I hold to be as much, if not more, Peristeromorphæ as Alectoromorphæ, in cranial as well as sternal characters.

\* The cranium was the only portion of this bird examined. It belonged to the Duc de Rivoli collection purchased by Dr. T. B. Wilson. It was labelled by that French naturalist *Rallus porzana*.

† *Rallus crepitans*, *R. aquaticus*, *R. maximus*; *Porphyrio martinica*, *P. smaragdinus*, *P. hyacinthinus*; *Gallinula chloropus*; *Grus monachus*, *G. americana*, and *Balearica pavonina*.

‡ The writer was not aware of the existence of Prof. Huxley's paper on the Alectoromorphæ until this article had passed through proof.

The basipterygoid processes are situated, like those in Columbidae, at the juncture of the basisphenoidal rostrum with the body of the sphenoid. As in the Doves, they are prominent and articulate with the pterygoids about midway between their anterior and posterior ends; while in the Alektoromorphæ they are flattened facets, sessile upon the rostrum, and articulate with the pterygoid bones near their anterior extremity. The other cranial characters resemble the Cocks.

The sternum is almost completely Peristeromorphous. The inner posterior notch on each side is converted into a foramen; the outer is wide and deep; both of which are Dove characters. The anterior inferior angle of the keel is less produced forward. In this particular it is like the walking birds.

In all the Gallinaceous birds examined the clavicles presented a large, broad process, which is developed downward from the summit of their symphysis. In the Doves it is wanting, as it also is in *Pterocles arenarius*.

On the whole, I think that it approaches the Peristeromorphæ more closely than the Alektoromorphæ.

#### DESMOGNATHÆ.

The third suborder, Desmognathæ, is divided into seven groups. They are named the Chenomorphæ, or Goose-form; the Amphimorphæ, a type intervening between the Goose and Stork form; the Pelargomorphæ, or Stork-form; the Dysporomorphæ, which have the Gannets as their type; Ætomorphæ, or Eagle-form; the Psittacomorphæ, or Parrot-form; the Cocygomorphæ, or Cuckoo-form; and the Celeomorphæ, or Woodpecker-form.

In the Chenomorphæ "the lachrymal region of the skull is remarkably long.

"The basisphenoidal rostrum has oval, sessile, basipterygoid facets.

"The flat and lamellar maxillo-palatines unite and form a bridge across the palate.

"The angle of the mandible is greatly produced and recurved.

"The sternum has a single pair of notches at its truncated posterior margin."

In this group Prof. Huxley places the *Palamedea*. The following are the peculiarities presented by the bones situated at the roof of the mouth in *Palamedea cornuta*. The maxillo-palatines are inflated. They unite with one another across the median line; but this union is not so extensive as that seen in the Anatidae. The bridge across the fissure is very narrow. The maxillo-palatines, anteriorly and posteriorly, are separated by a wide interval. The septum is entirely wanting, as it is in the Gallinaceous birds. Like this group, again, the anterior processes of the palatines are long and slender, and their posterior ends are rounded off. The posterior extremities of the palatines and the anterior extremities of the pterygoids do not articulate directly with the basisphenoidal rostrum, as stated by Huxley. A space, the tenth of an inch, intervenes between the rostrum and the upper surface of the palatines. The basipterygoid processes are long and prominent.

The lachrymal region of the skull is remarkably short. It presents the same condition in the Gallinæ.

The angle of the mandible is produced and recurved. This character exists as well in the Gallinæ as in the Anserine birds.

The sternum bears no resemblance either to the Gallinaceous birds or to the Anatidae. The external angles of the posterior extremity are produced more than the middle portion. A slight notch exists on one side. This backward extension of the postero-external angles of the sternum is characteristic also of the Albatrosses.

From the above description it will be seen that the *Palamedea cornuta* exhibits a decided resemblance to the Gallinaceous form. The closed palate should  
1870.]

not exclude it from the Alektoromorphæ; for the Cracidæ show the same structure in this respect.

A bird may present characters which are analagous to those found in another bird of a different family without there necessarily being any affinity between them. This is doubtless the case between the *Palamedea* and Anatidæ.

The following two characters may be added to those already laid down as belonging to the *Ardea*. They will be found to be highly characteristic.

A rather long and well-developed process is produced upward from the symphysis between the clavicles. The second peculiarity is in the internal angles of the distal ends of the coracoids. They override one another. This last peculiarity was first pointed out to me by Prof. O. C. Marsh, of Yale College.

In Coccothoromorphæ, according to Prof. Huxley, "basipterygoid processes are present only in one genus (*Trogon*).

"The maxillo-palatines are usually more or less spongy. The palatines are not developed into vertical plates, but are, as usual, horizontally flattened.

"The sternum usually presents two notches on each side, and has no bifurcated manubrial process (ex. *Merops*).

"The clavicles are convex forward, and without any process developed backward from the summit of their symphysis."

Basipterygoid processes were found in *Priotelus temnurus*, of the family Trogonidæ. They are present in *Turacus albocristatus*, of the Musophagidæ, but here they are rudimentary. They do not articulate with the pterygoids.

Huxley states that in *Merops* the "palatines are devoid of any postero-external elongations." In *Merops ægypticus*, *M. Leschenaultii* and *M. amicta* the postero-external elongations are quite prominent.

In *Psilopogon pyrolophus* and *Megalaima chrysopogon*, of the family Capitonidæ, the vomer presents an appearance which is somewhat singular. It is well developed. Its anterior extremity is bifurcated, and each prong of this forked end is produced to the maxillo-palatine process of the corresponding side, and becomes united with it. This form of the vomer is doubtless a family characteristic.

It was chiefly in the sternal characters that the members of the group Coccothoromorphæ were found to differ from the statements laid down by Mr. Huxley.

In all the members of the family Cuculidæ examined,\* the clavicles presented a well-developed process at the summit of their symphysis. The same process was also observed in *Priotelus temnurus*. In this bird the manubrial process of the sternum presented a groove on its upper surface, showing a tendency for it to become bifurcated.

The clavicles may or may not be convex forward. In the Musophagidæ (*Turacus*) and in *Bubulus Duvaucelii*, the anterior surfaces of the clavicles are straight from above downward. This is an Owl character. The family Musophagidæ is stated by Prof. Huxley as approaching the Etomorphæ.

In *Psilopogon* and *Megalaima*, of the family Capitonidæ, and in *Ramphastos*, the proximal extremities of the clavicles are expanded and T-shaped. This character is common to the Celeomorphæ and the true Passerine birds. Its presence in Capitonidæ and Ramphastidæ serves to connect them rather with the Woodpecker than with the Passeres.

The two families under consideration present another character in common. The distal ends of the clavicles are not ankylosed, but are separated by an interval.

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\* *Saurothera Merlini*, *Phœnicophaeus viridis*, *Bubulus Duvaucelii*, *Cuculus canorus*, *C. lucidus*, *Eudynamis orientalis*, and *Centropus gigas*.